CIAT 1967-2017

Stewardship Report

Achieving Food Security and Rural Prosperity Across the Tropics

CIAT's Partnership with Japan

Agricultural Research for Inclusive and Equitable Growth

CIAT's Global Vision

When CIAT opened its doors in 1967, its founders saw the vast tropical region as a world of promise. Agriculture, aided by the latest science and technology, could substantially contribute to reducing global hunger and poverty.

Since its founding, CIAT has been involved in nearly every aspect of tropical agriculture: the crop varieties that farmers grow, the production systems they manage, the agricultural landscapes they inhabit, the markets in which they participate, and the policies that influence their options and decisions.

Focusing on the development of cassava, common bean, and tropical forages, together with rice in Latin America, the Center plays a vital role in preserving the world's agricultural biodiversity, while helping to boost nutrition and food security, eradicate hunger, and increase poor rural people's benefits from market participation.

Alongside research on these major crops, CIAT works in two other key areas that cut across all tropical crops and production environments. Through its Soils and Landscapes for Sustainability (SoiLS) research area, the Center intensifies sustainable crop production, while improving the ecosystems which rural communities depend upon. And its Decision and Policy Analysis (DAPA) research area harnesses the power of information to influence actions concerning climate change adaptation and mitigation, sustainable ecosystem management, and linking farmers to markets.

The year of 2017 marks CIAT's 50th anniversary of delivering agricultural research for development. This major milestone has led us to mindfully align our research to realize our vision of a sustainable food future. Looking ahead, CIAT seeks to address both the challenges and the opportunities brought about by globalization, in order to promote equitable growth.

One of these opportunities is the creation and access to data. CIAT, together with IFPRI, co-leads the CGIAR Platform for Big Data in Agriculture to connect smallholders with weather and value chain information to boost production and market access. Meanwhile, our *Future Seeds* initiative will harness new technologies to develop a digital genebank, increasing knowledge-sharing with researchers worldwide, while also distributing improved crops to smallholders.

Through these initiatives and in conjunction with Japan, CIAT will continue to promote equitable growth by developing these new technologies and sharing the knowledge and methods that can bring sustainable agriculture within the reach of smallholder farmers, while making production more competitive and profitable, promoting prosperity, and strengthening resilience.

Linking farmers to markets: A better deal for farmers and consumers

Against a background of rapid modernization and globalization, smallholder agriculture has enormous potential to act as an engine of inclusive economic growth. CIAT moves smallholder agriculture from subsistence to profit, to ensure all children, women and men have access to affordable and healthy food through sustainable food systems.

CIAT is developing methods and tools, and conducting research on enabling policies that help build sustained and beneficial commercial relations between farmers' organizations and buyers in diverse markets.

Photo: G. Smith/CIAT.

"Cassava is a critical source of calories for around half a billion people a day, and is becoming much more than just a subsistence crop"

Cassava starch processing in Hanoi, Vietnam (photo: N. Palmer/CIAT).

The Japan-CIAT Partnership

Fostering inclusive and dynamic development in agriculture

CIAT's long and productive history of collaboration with Japanese institutions dates back to 1972. Since then, Japan has shared its significant agricultural science and technology capabilities, and its collaborative research is an essential part of these efforts. Today, Japan's strategy is shifting in response to the advance of globalization, addressing both the threats and opportunities that globalization presents.

CIAT can significantly contribute to Japan International Cooperation Agency (JICA)'s new vision that focuses on inclusive and dynamic development by working on the ground to improve grassroots identification, participation, and rewards of development, while responding quickly and dynamically to ever-changing needs. We look forward to aligning our shared aspirations and strengthening partnerships with Japanese institutions to achieve food security and reduce poverty in the tropics.

Boosting growth in the agricultural productivity of smallholders through active involvement of the community is one of the most effective strategies for reducing extreme poverty and hunger. CIAT and Japan's collaboration go further to link poor farmers with markets and to empower them with skills and technology that help raise living standards and provide a food-secure future for rural families despite daunting political, social, and environmental challenges.

Research partnerships with JICA, Japan's Ministry of Foreign Affairs (MOFA), and Ministry of Agriculture, Forestry, and Fisheries (MAFF), as well as with the Nippon Foundation and Japan International Research Center for Agricultural Sciences (JIRCAS), have created substantial benefits for rural people throughout the tropics. We are grateful to the Government of Japan, JICA, and other Japanese institutions and universities for their steadfast commitment to CIAT's impact-oriented initiatives.

At the cutting edge

Over the last 50 years, CIAT scientists have worked at the cutting edge of scientific innovation. An impressive track record of achievement includes research on new varieties of cassava in Southeast Asia, which have generated economic gains to the tune of US$12 billion over the last two decades. In sub-Saharan Africa, research on new bean varieties has translated into benefits worth more than US$200 million for 8 million rural households.

Of course, achievements such as these are not made in isolation. To achieve the goals of Agenda 2030 and to support smallholder agriculture development and rural transformation, CIAT prides itself on strong partnerships with private enterprises, governments, research partners, and NGOs, such as the Ministry of Foreign Affairs, JIRCAS, JICA, and the Nippon Foundation.

Think global, act local

Technology is a key driving force of agricultural development. CIAT is uniquely positioned to stay ahead of new threats to global food security through a constant search for technological solutions to agricultural problems. The Center continues to strengthen South-South partnerships, ensuring that these solutions are appropriate and practical under local conditions.

CIAT works in 53 countries, with 21 offices and field sites around the world. CIAT has nearly 1,000 staff across three regions: Latin America and the Caribbean, Africa, and Asia. Many are based out of regional offices located in Cali, Colombia (HQ), Nairobi, Kenya, and Hanoi, Vietnam.

This dynamic team detects and monitors threats to nutrition and food security in the tropics, particularly among the rural poor, with the aim of delivering large development impact by tapping scientific knowledge and honing innovative ideas into first-class initiatives.

Impact of Japanese Investments

Grassroots action to suppress greenhouse emissions

Scientists at CIAT and JIRCAS have discovered that a tropical grass (*Brachiaria humidicola*) – which the *Japan Times* called "super grass" – may be agriculture's best bet for mitigating climate change. A biochemical mechanism in this grass – "biological nitrification inhibition" or BNI – markedly reduces the conversion of nitrogen from fertilizer into nitrous oxide, the most potent greenhouse gas.

By suppressing nitrification, new grass hybrids can thus deliver enormous environmental benefits while also boosting crop and livestock productivity through more efficient fertilizer use. Recent trials showed, for example, that a maize crop grown after *B. humidicola* can give good yields with only half the amount of fertilizer normally applied.

After over 15 years of collaborative research, BNI has advanced to the "proof-of-concept" stage, and we are laying the groundwork for large-scale development and dissemination of *B. humidicola* hybrids.

To begin reaping the environmental and economic benefits of this improved grass on a large scale, researchers are working on several fronts. Forage grass breeders are developing superior *B. humidicola* hybrids and seeking to accelerate hybrid selection through the use of molecular markers.

At the same time, scientists are using participatory methods to evaluate the *B. humidicola* hybrids already available with smallholder farmers in Colombia and Nicaragua. Together, they're learning how best to integrate the hybrids into crop–livestock systems. In addition, researchers are using advanced simulation models and economic analysis to project where the new hybrids can be profitably introduced.

The scope for integrating these materials into crop–livestock systems is quite large, especially in Latin America, where various *Brachiaria* grass species are already the main feed resource for livestock production.

Grass hybrids, developed with support from JIRCAS, can reduce nitrification while boosting production (photo: N. Palmer/CIAT).

Thanks to funding from JIRCAS, *Brachiaria* grasses have the potential to impact smallholders across Latin America, sub-Saharan Africa, and upland areas of Southeast Asia.

> *"This approach offers tremendous possibilities to reduce nitrous oxide emissions and the leaching of polluting nitrates into water supplies, while also raising crop yields through more efficient use of nitrogen fertilizer"*
>
> *G.V. Subbarao*

International cooperation for development impact

Since 2014, CIAT has collaborated with JICA and Japan Science and Technology Agency (JST) for technology and knowledge transfer through the project "Development and adoption of Latin American low-input rice production systems through genetic improvement and advanced field management in the Republic of Colombia."

The initiative's primary objective is to help Colombian farmers and the rice sector as a whole become more productive and competitive through genetic improvement and the use of precision agriculture technologies to improve crop management.

In 2016, JICA and Japan Science and Technology Agency (JST) hosted Colombian researchers in Yosano, Japan. Participants from Colombia's National Rice Growers Federation (Fedearroz), the Latin American Fund for Irrigated Rice (FLAR), and Colombia's Ministry of Agriculture and Rural Development (MADR) learned about the implementation of "e-kakashi," a new IoT (internet of things) technology for crop management.

Rice is an economically important staple crop in Colombia, contributing about 14% of caloric intake in the country. Colombia looks to Japan as a model of self-sufficient rice production, and hopes to adapt Japanese techniques to their fields. Between 2 and 2.4 million tons of rice are produced in Colombia each year on 438,000 hectares, making it the crop

with the largest cultivated area for annual production.

CIAT scientists are providing technical expertise on genetic improvement, efficient crop and soil management, efficient use of water, and technology transfer.

Game-changing cassava technologies

Cassava is a vital source of food and livestock feed in Asia, and also provides raw material for the manufacturing of pharmaceuticals, industrial starch, biofuels, and other products. CIAT's fruitful partnership with Japanese institutions, such as the Nippon Foundation, the Ministry of Foreign Affairs, and the Ministry of Agriculture, Forestry and Fisheries, has achieved significant increases in cassava production and productivity, strengthening rural household and national economies.

"Integrated cassava-based cropping systems in Asia," with support from the Nippon Foundation, created new opportunities for the rural poor to raise their incomes and respond to increased demand for cassava products. For example, in Vietnam 15,000–20,000 households adopted various new technologies. The economic benefit of increased cassava yield and additional pig production, as a result of these new technologies, was valued at US$2.2 million per year.

While the project has come to close, current projects like "Sustainable Production of Cassava in ASEAN countries by Development and Adaptation of Pest and Disease Management," supported by MOFA and MAFF, will build on its legacy for enduring benefits for hundreds of rural families remain, together with a long list of options for widening development impact.

Average cassava yields have doubled since CIAT started working in Asia.

"Technology transference from Japan is important to make Colombia more self-sufficient in rice production"

Photo: N. Palmer/CIAT.

Japan-funded projects

Project Name	CIAT Leader(s)	Date	US$ ('000)
Environmental protection using traits associated with biological nitrification inhibition (BNI) – development of a productive and profitable cropping system using the BNI function of tropical forage grass (MAFF)	Tropical Forages	2014–2019	209.29
Sustainable Production of Cassava in ASEAN countries by Development and Adaptation of Pest and Disease Management (MOFA-MAFF)	Cassava	2016–2017	117.6
Evaluation of drought tolerance of upland rice transformed with environmental stress tolerance genes and selection of elite lines (JIRCAS)	Rice	2016–2017	96.83
Provision of Seeds and Capacity Building for Advanced Agricultural Technology (beans) (MOFA-MAFF)	Beans	2016–2017	78.4
Quantifying the BNI-residual effect from *B. humidicola* on N-recovery and N-use efficiency (NUE) of the subsequent annual crops (JIRCAS)	Tropical Forages	2015–2017	43.53
Sustainable Production of Cassava in Asia by Development and Adaptation of Pest and Disease Management in the Region (MOFA-MAFF)	Cassava	2015–2016	117.6
Evaluation of drought tolerance of upland rice transformed with environmental stress tolerance genes and selection of elite lines (JIRCAS)	Rice	2015–2016	99.71
1) Improving Nitrogen Use Efficiency of Crops and Reducing Greenhouse Gas Emissions from Agriculture; 2) Establishment of Asia Cassava Molecular Breeding Network (MAFF)	Cassava	2014–2015	144
Evaluation of drought tolerance of upland rice transformed with environmental stress tolerance genes and selection of elite lines (JIRCAS)	Rice	2014–2015	98.75
Quantifying the BNI-residual effect from *B. humidicola* on N-recovery and N-use efficiency (NUE) of the subsequent annual crops (JIRCAS)	Tropical Forages	2014–2015	23.59
Project for the development and adoption of a low-input rice production system for Latin America through genetic improvement and advanced technologies for crop management - SATREPS (JICA)	Rice	2014–2015	139.07

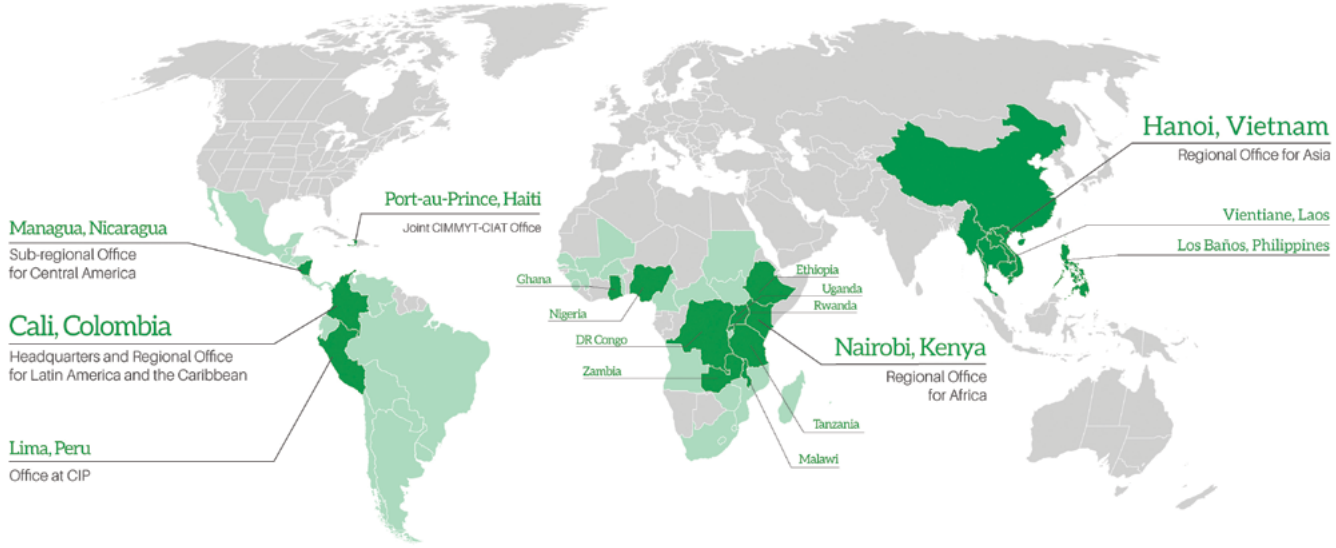
Promise to partners

CIAT's research and related activities are demand driven and closely monitored and evaluated for social and environmental impact and relevance to the livelihoods of the poor. Our research is carried out with the highest integrity and transparency. Innovation and creativity are key drivers of our research, and we take into account gender and cultural diversity through the use of effective methods for knowledge sharing and learning to deliver lasting impact.

Looking forward: Developing joint visions

In line with Japan's strategic objectives of inclusive and dynamic development for reducing poverty through equitable growth, CIAT's work harnesses global expertise and partnerships to find innovative solutions to global problems. A strong example of this has been our collaborative research on *Brachiaria* BNI, and we hope to continue these efforts through further conservation of varieties and research on its production and BNI potential under other conditions. We look forward to working with longstanding partners like Japan to find innovative solutions to global challenges like this one.

The global reach of CIAT research



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